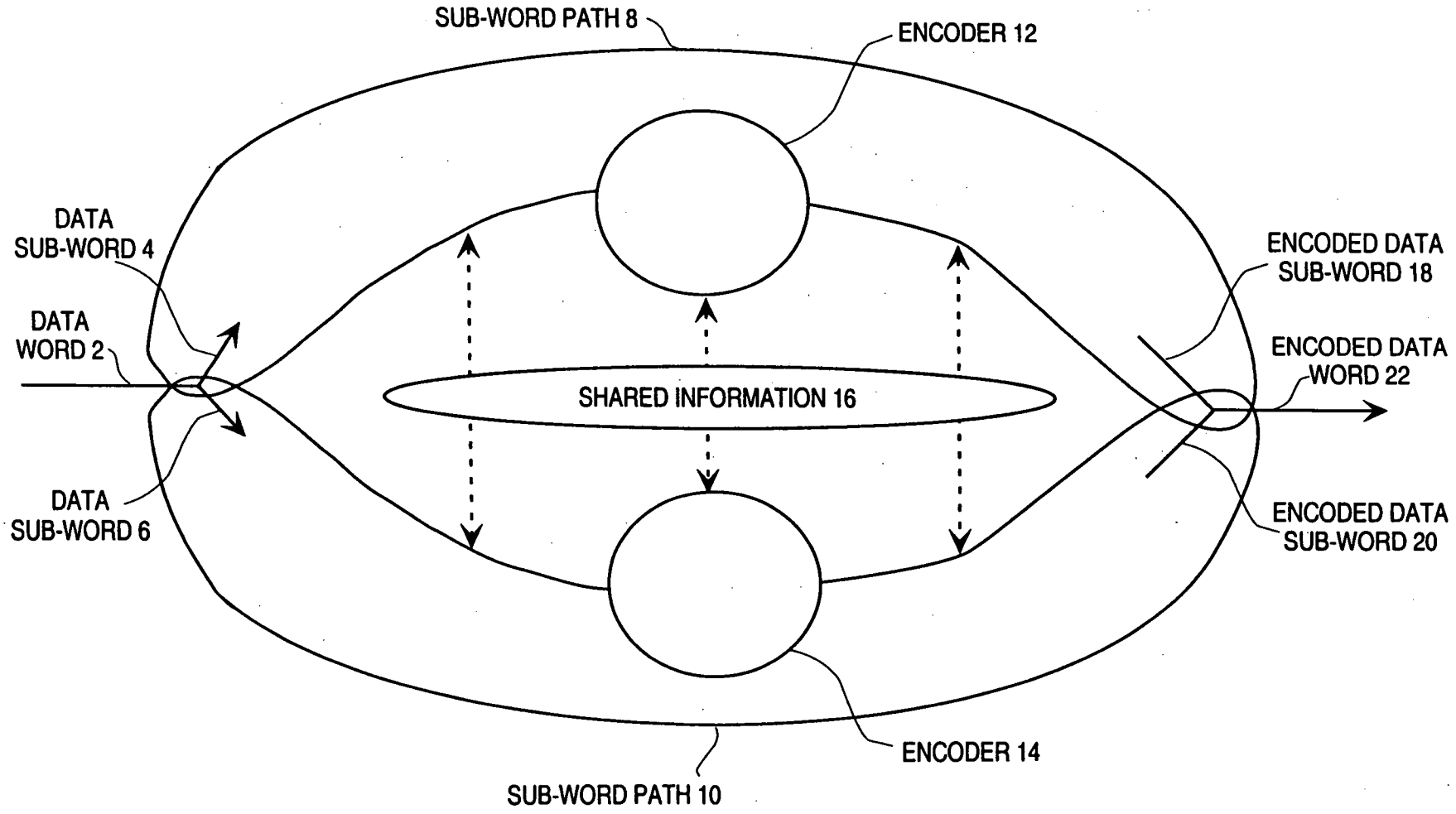



FIG. 1

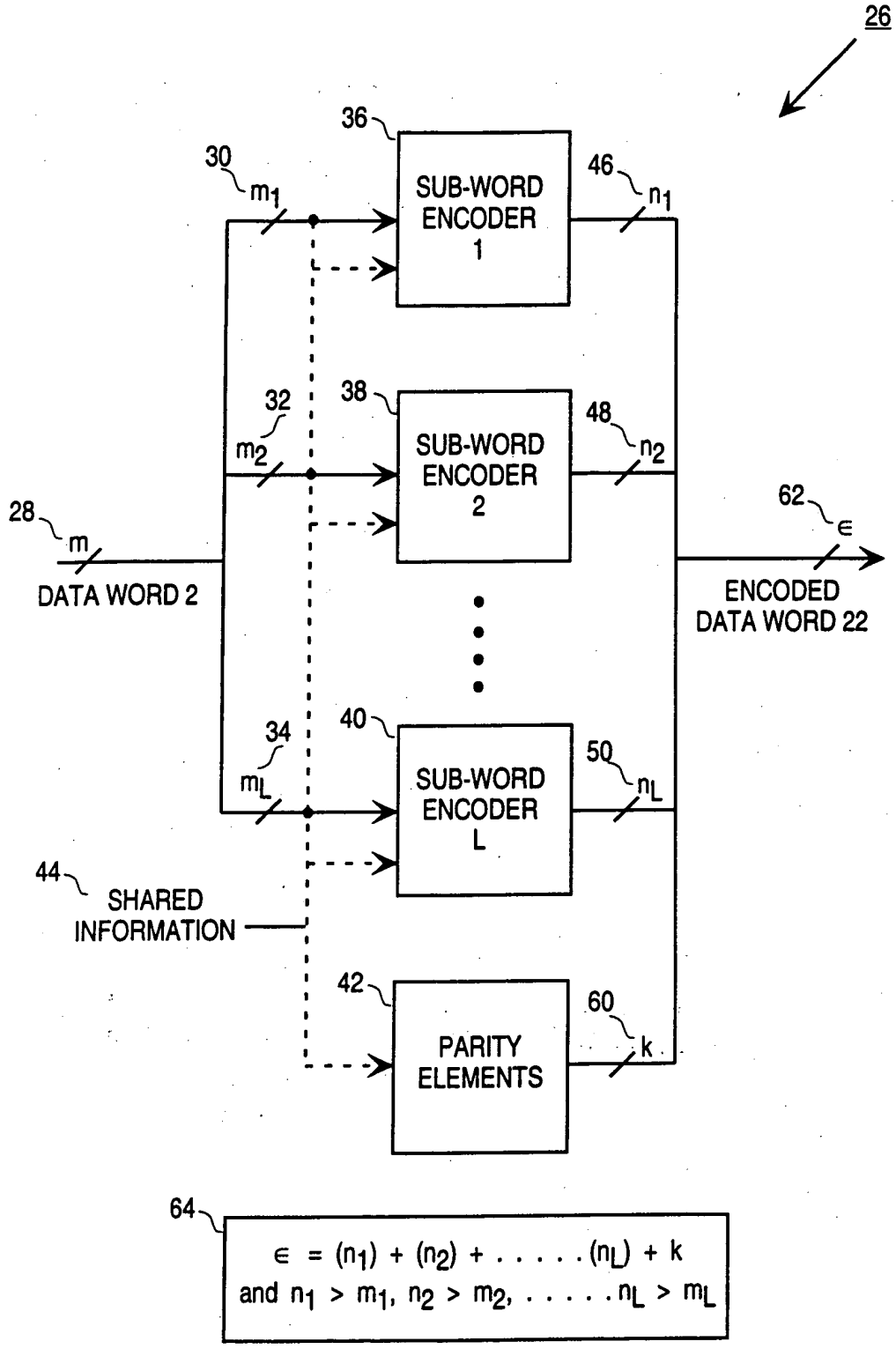

26
36
30
$m_1$
SUB-WORD ENCODER 1
46
$n_1$
32
38
$m_2$
SUB-WORD ENCODER 2
48
$n_2$
28
m
DATA WORD 2
62
∈
ENCODED DATA WORD 22
40
34
$m_L$
SUB-WORD ENCODER L
50
$n_L$
44
SHARED INFORMATION
42
PARITY ELEMENTS
60
k
64
∈ = $(n_1)$ + $(n_2)$ + . . . . . $(n_L)$ + k
and $n_1 > m_1$, $n_2 > m_2$, . . . . . $n_L > m_L$

FIG. 2

FIG. 3

66

NUMBER OF ENCODED LINES (n)

| | p=0 | p=1 | p=2 | p=3 | p=4 | p=5 | p=6 | p=7 | p=8 | p=9 | p=10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| n = 1 | 1. | 1. | | | | | | | | | |
| n = 2 | 1. | 2. | 1. | | | | | | | | |
| n = 3 | 1. | 3. | 3. | 1. | | | | | | | |
| n = 4 | 1. | 4. | 6. | 4. | 1. | | | | | | |
| n = 5 | 1. | 5. | 10. | 10. | 5. | 1. | | | | | |
| n = 6 | 1. | 6. | 15. | 20. | 15. | 6. | 1. | | | | |
| n = 7 | 1. | 7. | 21. | 35. | 35. | 21. | 7. | 1. | | | |
| n = 8 | 1. | 8. | 28. | 56. | 70. | 56. | 28. | 8. | 1. | | |
| n = 9 | 1. | 9. | 36. | 84. | 126. | 126. | 84. | 36. | 9. | 1. | |
| n = 10 | 1. | 10. | 45. | 120. | 210. | 252. | 210. | 120. | 45. | 10. | 1. |

NUMBER OF ONES (P) IN AN ENCODED WORD

FIG. 4

68

| ENCODED WORD LENGTH | CODE STATES | INPUT WORD LENGTH | EXTRA LINES |
|---|---|---|---|
| 3 | 2 | 1 | 2 |
| 4 | 6 | 2 | 2 |
| 5 | 10 | 3 | 2 |
| 6 | 20 | 4 | 2 |
| 7 | 35 | 5 | 2 |
| 8 | 70 | 6 | 2 |
| 9 | 126 | 6 | 3 |
| 10 | 252 | 7 | 3 |
| 11 | 462 | 8 | 3 |
| 12 | 924 | 9 | 3 |
| 13 | 1716 | 10 | 3 |
| 14 | 3432 | 11 | 3 |
| 15 | 6435 | 12 | 3 |
| 16 | 12870 | 13 | 3 |
| 17 | 24310 | 14 | 3 |
| 18 | 48620 | 15 | 3 |
| 19 | 92378 | 16 | 3 |
| 20 | 184756 | 17 | 3 |
| 21 | 352716 | 18 | 3 |

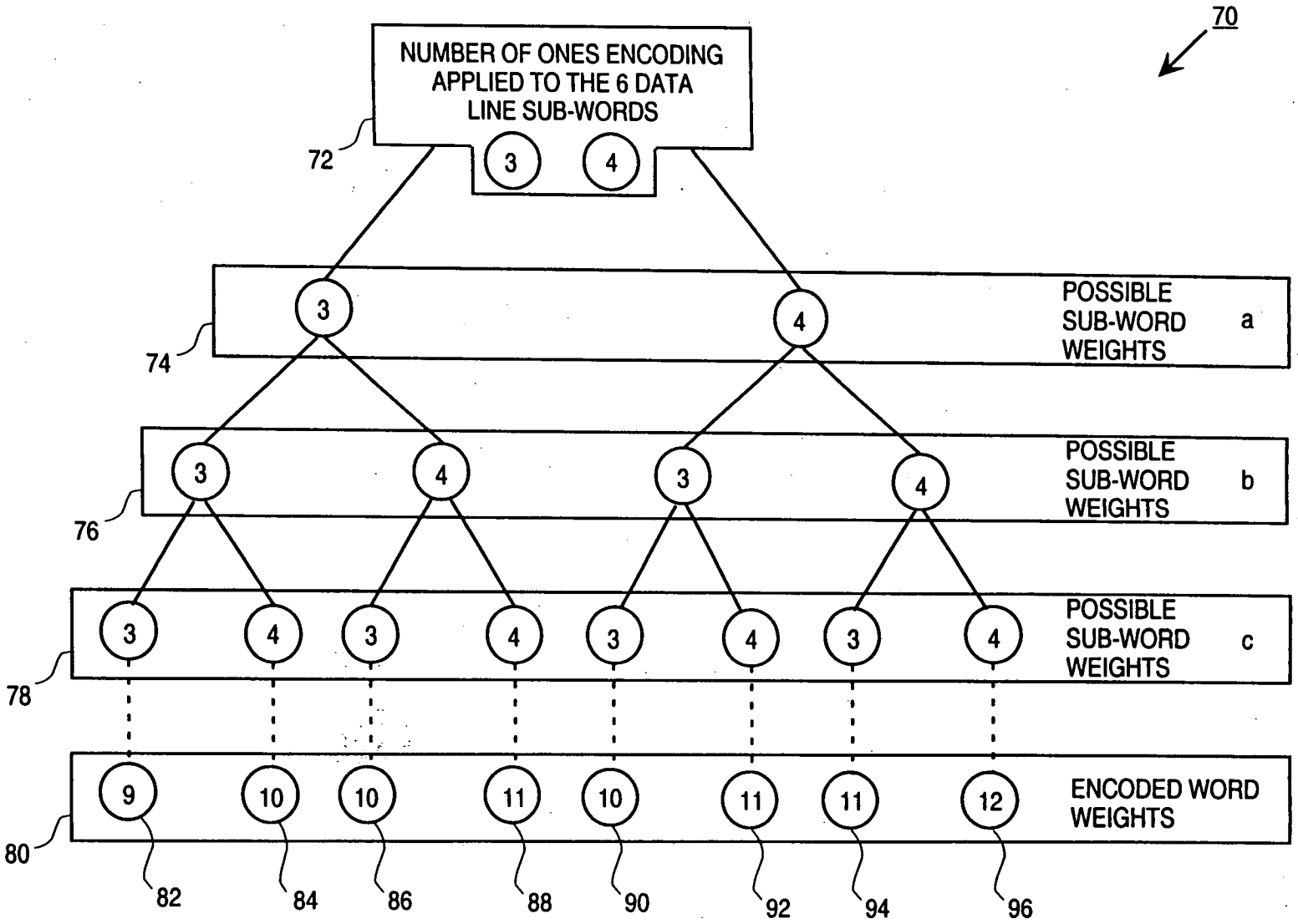

70
NUMBER OF ONES ENCODING APPLIED TO THE 6 DATA LINE SUB-WORDS
72
3
4
POSSIBLE SUB-WORD WEIGHTS a
74
POSSIBLE SUB-WORD WEIGHTS b
76
POSSIBLE SUB-WORD WEIGHTS c
78
ENCODED WORD WEIGHTS
80
9
10
10
11
10
11
11
12
82
84
86
88
90
92
94
96

FIG. 5

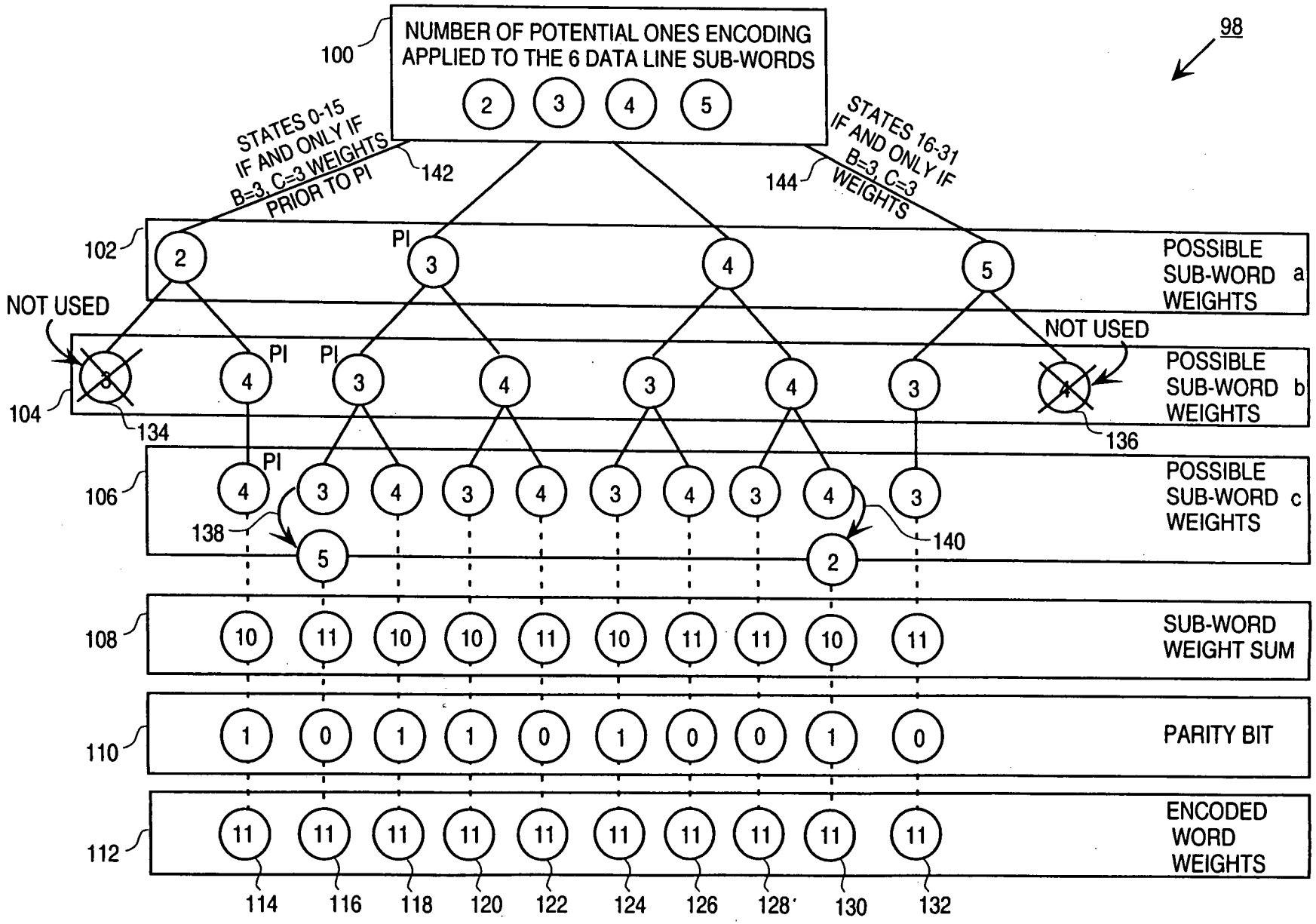

98
100
NUMBER OF POTENTIAL ONES ENCODING APPLIED TO THE 6 DATA LINE SUB-WORDS
2 3 4 5
STATES 0-15 IF AND ONLY IF B=3, C=3 WEIGHTS PRIOR TO PI
142
STATES 16-31 IF AND ONLY IF B=3, C=3 WEIGHTS
144
102
PI
NOT USED
POSSIBLE SUB-WORD a WEIGHTS
NOT USED
PI
PI
POSSIBLE SUB-WORD b WEIGHTS
104
134
136
PI
106
POSSIBLE SUB-WORD c WEIGHTS
138
140
108
SUB-WORD WEIGHT SUM
10 11 10 10 11 10 11 11 10 11
110
PARITY BIT
1 0 1 1 0 1 0 0 1 0
112
ENCODED WORD WEIGHTS
11 11 11 11 11 11 11 11 11 11
114 116 118 120 122 124 126 128 130 132

FIG. 6

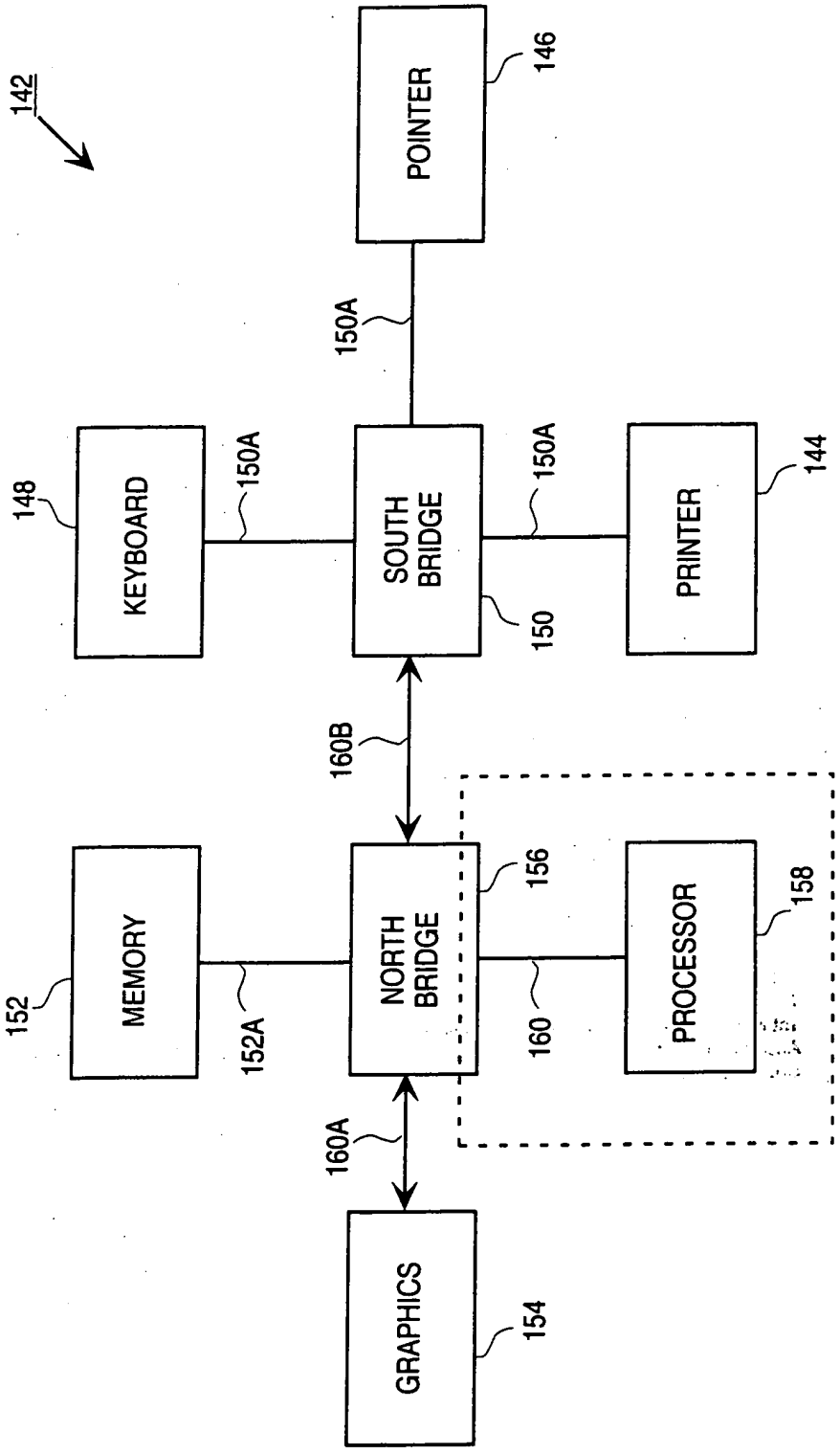

142
POINTER
146
150A
KEYBOARD
148
150A
SOUTH BRIDGE
150A
PRINTER
144
150
160B
MEMORY
152
152A
NORTH BRIDGE
156
PROCESSOR
158
160
160A
GRAPHICS
154

FIG. 7

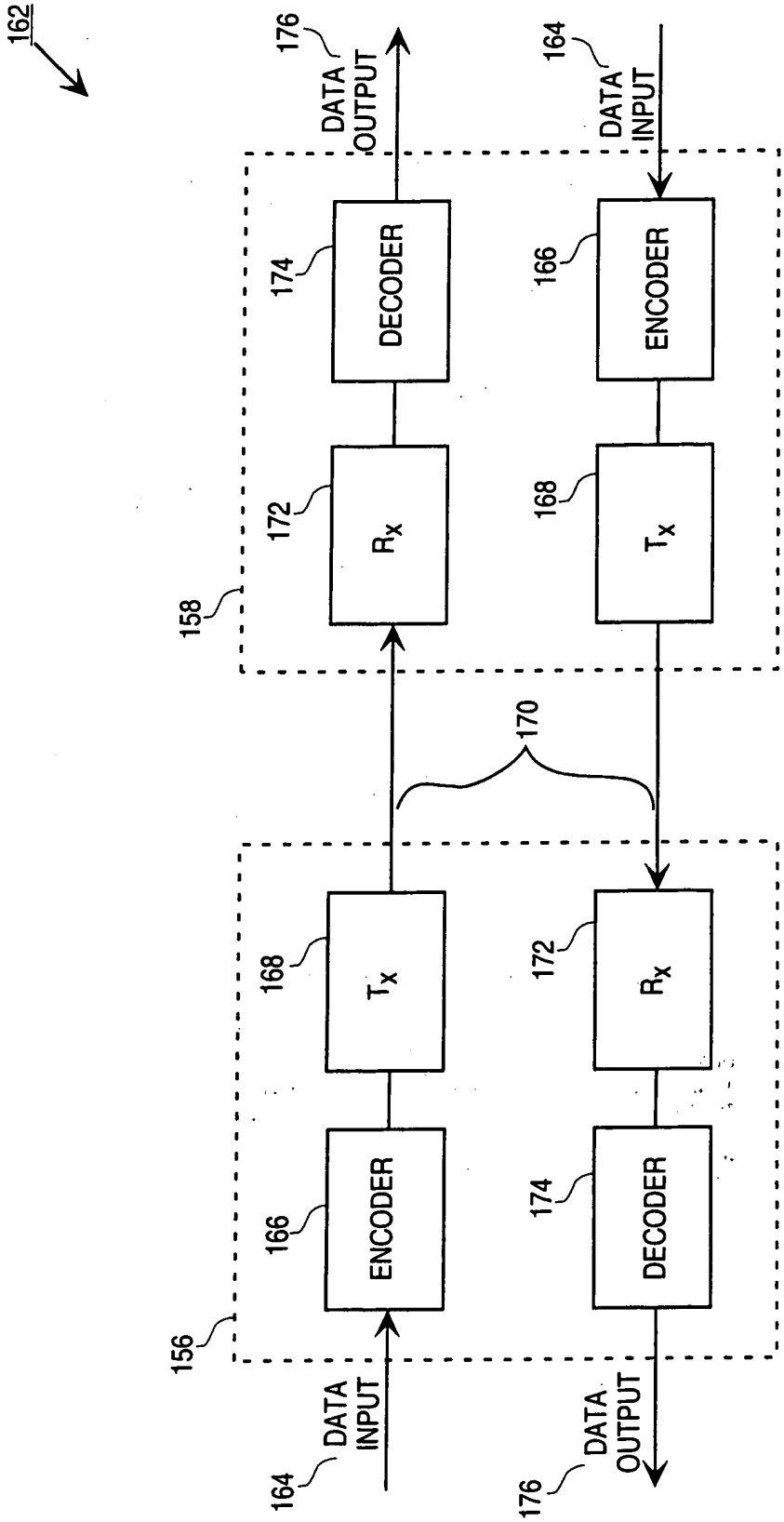

162
176
DATA OUTPUT
164
DATA INPUT
174
DECODER
166
ENCODER
172
$R_x$
168
$T_x$
158
170
168
$T_x$
172
$R_x$
166
ENCODER
174
DECODER
156
164
DATA INPUT
176
DATA OUTPUT

FIG. 8

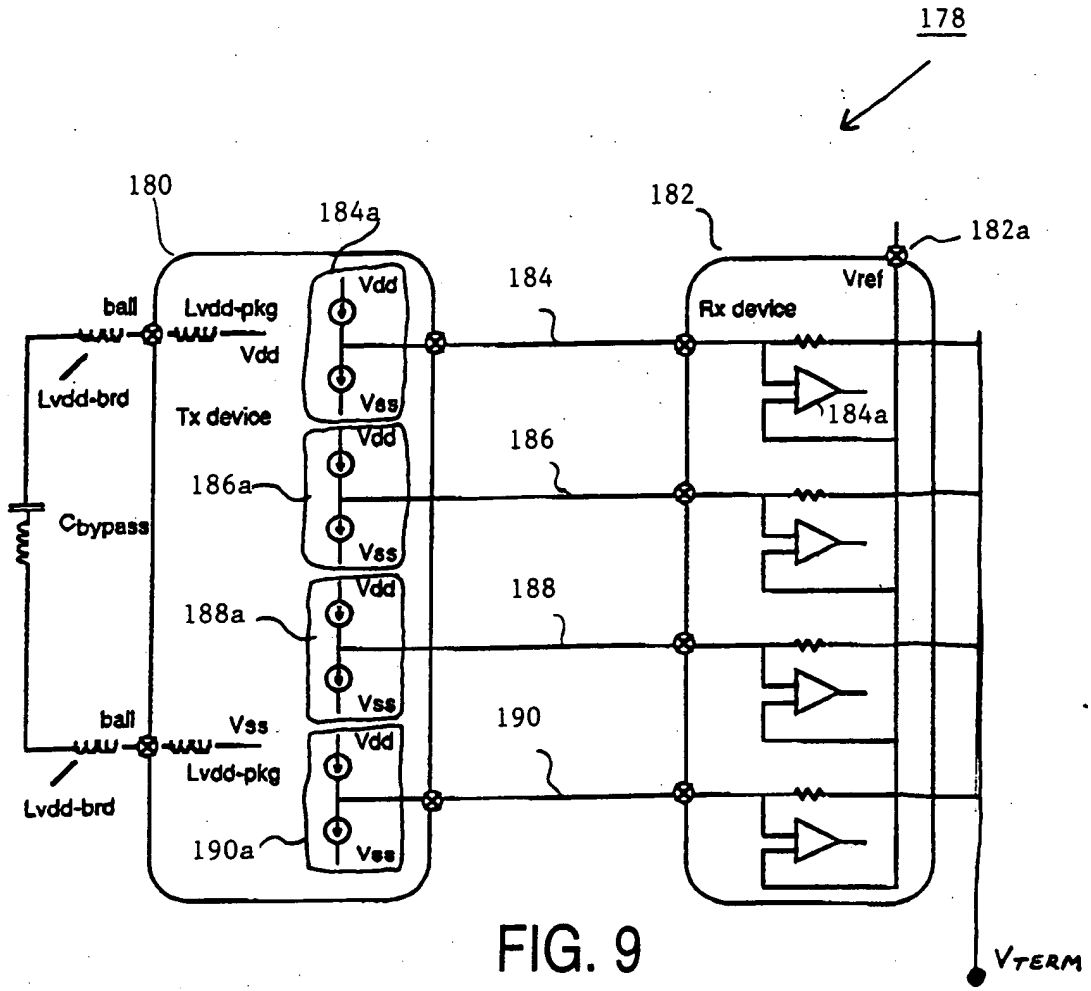

178
180
184a
182
182a
Vref
Rx device
184
ball
Lvdd-pkg
Vdd
Lvdd-brd
Tx device
Vdd
Vss
184a
186
186a
Cbypass
Vdd
Vss
188
188a
Vdd
Vss
ball
Vss
Lvdd-pkg
Lvdd-brd
190
Vdd
190a
Vss
VTERM

FIG. 9

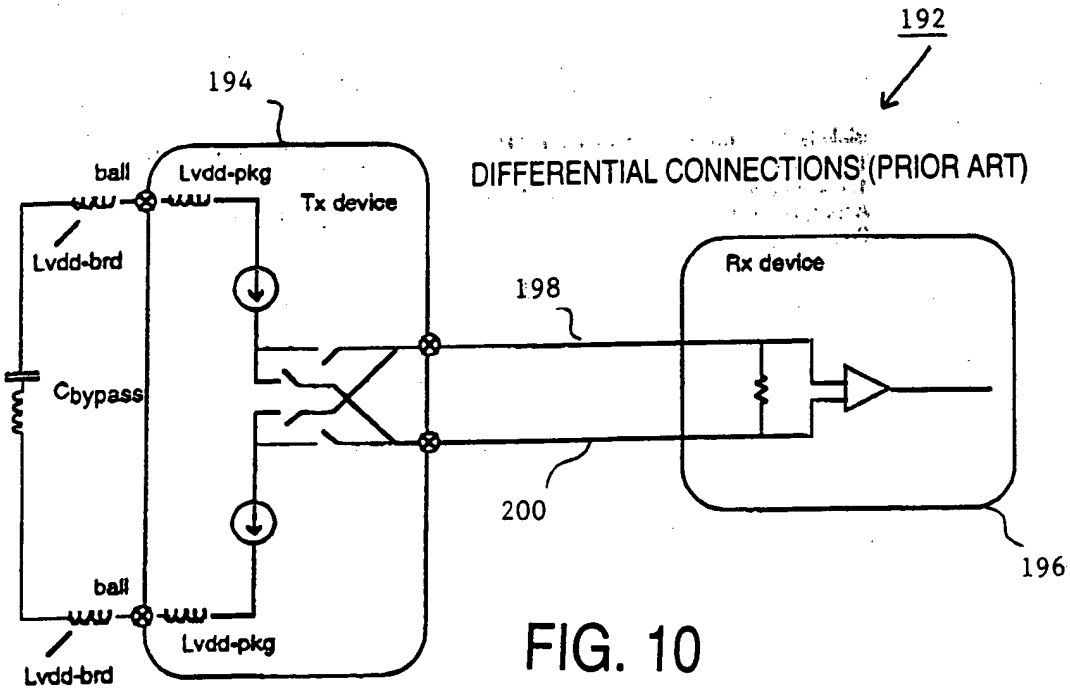

192
194
DIFFERENTIAL CONNECTIONS (PRIOR ART)
ball
Lvdd-pkg
Tx device
Lvdd-brd
Rx device
198
Cbypass
200
196
ball
Lvdd-pkg
Lvdd-brd

FIG. 10

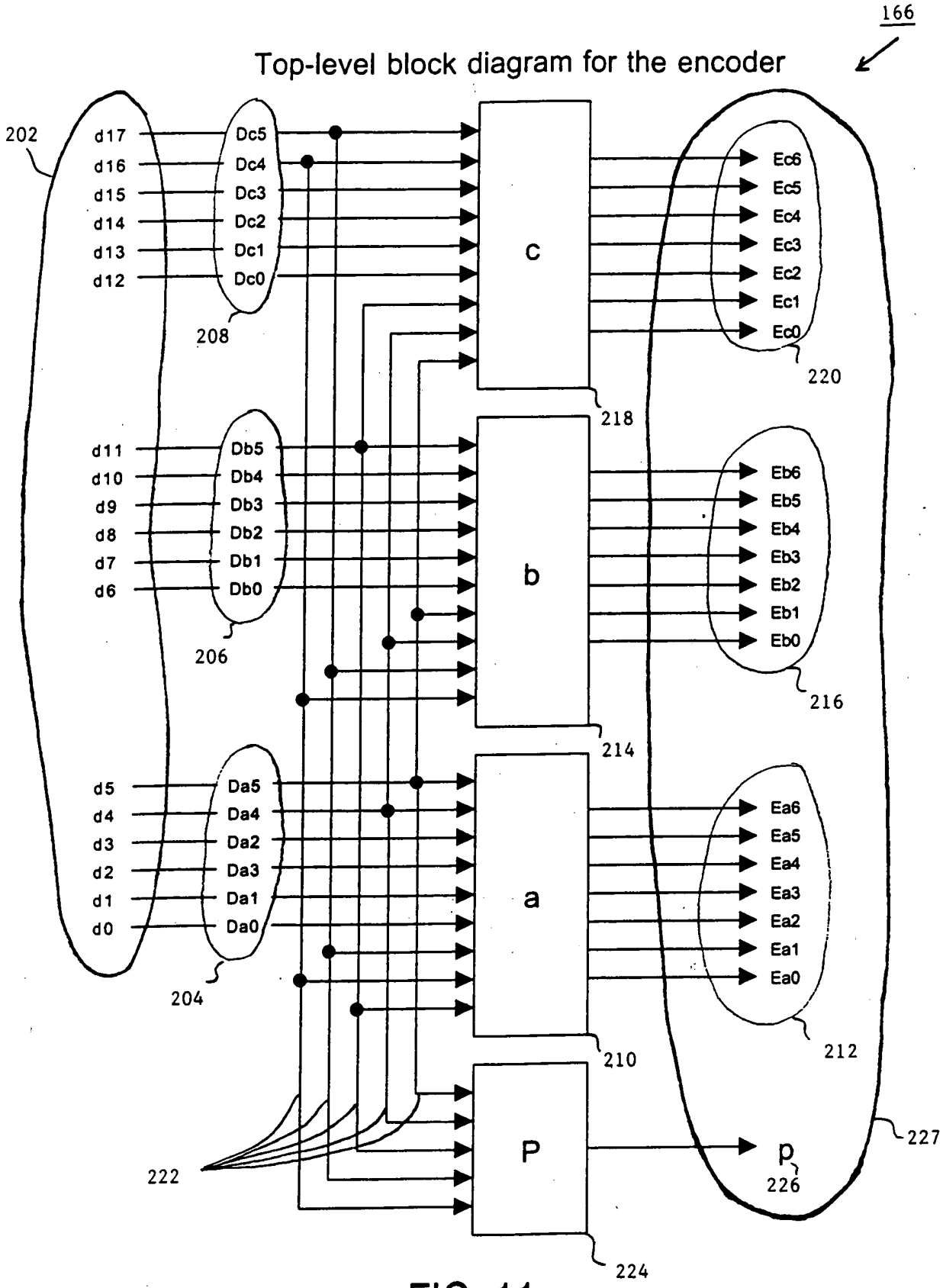

166
Top-level block diagram for the encoder
202
d17
d16
d15
d14
d13
d12
Dc5
Dc4
Dc3
Dc2
Dc1
Dc0
208
c
218
Ec6
Ec5
Ec4
Ec3
Ec2
Ec1
Ec0
220
d11
d10
d9
d8
d7
d6
Db5
Db4
Db3
Db2
Db1
Db0
206
b
214
Eb6
Eb5
Eb4
Eb3
Eb2
Eb1
Eb0
216
d5
d4
d3
d2
d1
d0
Da5
Da4
Da2
Da3
Da1
Da0
204
a
210
Ea6
Ea5
Ea4
Ea3
Ea2
Ea1
Ea0
212
222
P
224
p
226
227

FIG. 11

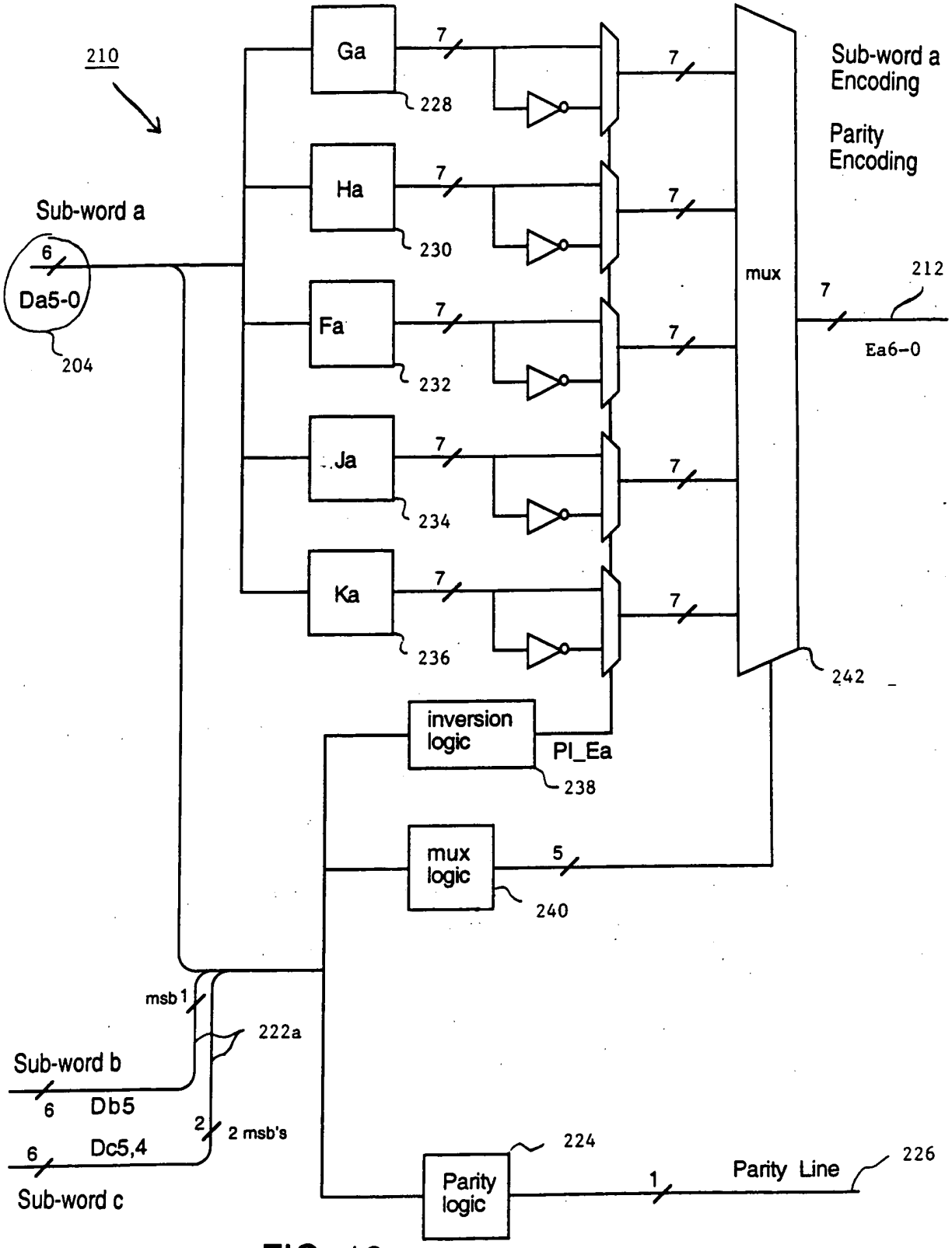

210
Ga
Ha
Fa
Ja
Ka
7
228
230
232
234
236
Sub-word a
6
Da5-0
204
Sub-word a Encoding
Parity Encoding
mux
212
Ea6-0
242
inversion logic
PI_Ea
238
mux logic
5
240
msb 1
222a
Sub-word b
6
Db5
2
2 msb's
6
Dc5,4
Sub-word c
224
Parity logic
1
Parity Line
226

FIG. 12

## Encode Truth Tables for Block Diagram Elements of Sub-word a

240a

**Subchannel a Mux Truth Table**

| Da5 | Da4 | Da3 | Da2 | Db5 + Dc5 | Block |
|---|---|---|---|---|---|
| 0 | 0 | 0 | x | 0 | G |
| 0 | 0 | 0 | 0 | 1 | G |
| 0 | 0 | 0 | 1 | 1 | F1 |
| 0 | 0 | 1 | x | x | J |
| 0 | 1 | 0 | x | 0 | K |
| 0 | 1 | 0 | x | 1 | J |
| 0 | 1 | 1 | x | 0 | H |
| 0 | 1 | 1 | x | 1 | K |
| 1 | 0 | 0 | x | x | J |
| 1 | 0 | 1 | x | x | K |
| 1 | 1 | 0 | x | x | K |
| 1 | 1 | 1 | 0 | x | F2 |
| 1 | 1 | 1 | 1 | x | H |

238a

**Subch a Post Inversion Truth Table**

| Da5·Db5·Dc5·Dc4 | Pl Ea |
|---|---|
| 0 | no inversion |
| 1 | invert |

224a

**Truth Table for Parity Bit**

| Da4 | Da5 | Db5 | Dc5 | Dc4 | Parity Bit |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | x | 1 |
| 1 | 0 | 0 | 0 | x | 0 |
| x | 0 | 0 | 1 | x | 1 |
| x | 0 | 1 | 0 | x | 1 |
| x | 0 | 1 | 1 | x | 0 |
| x | 1 | 0 | 0 | x | 1 |
| x | 1 | 0 | 1 | x | 0 |
| x | 1 | 1 | 0 | x | 0 |
| x | 1 | 1 | 1 | 0 | 1 |
| x | 1 | 1 | 1 | 1 | 0 |

**Block Ga**

| Da1 | Da0 | Ea4-0 |
|---|---|---|
| 0 | 0 | 10000 |
| 0 | 1 | 01000 |
| 1 | 0 | 00100 |
| 1 | 1 | 00010 |

228a

| Db5 + Dc5 | Da2 | Ea6 | Ea5 |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | x | 1 | 1 |

**Block Ha**

| Da1 | Da0 | Ea4-0 |
|---|---|---|
| 0 | 0 | 11101 |
| 0 | 1 | 11011 |
| 1 | 0 | 10111 |
| 1 | 1 | 01111 |

230a

| Db5 + Dc5 | Da2 | Ea6 | Ea5 |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | x | 0 | 0 |

**Block Fa**

| Da1 | Da0 | Ea4-0 |
|---|---|---|
| 0 | 0 | 11000 |
| 0 | 1 | 10100 |
| 1 | 0 | 01011 |
| 1 | 1 | 00111 |

| Da2 | Da1 | | Ea6 | Ea5 |
|---|---|---|---|---|
| x | 0 | | 1 | |
| x | 1 | | 0 | |
| 0 | x | | | 0 |
| 1 | x | | | |

232a

234a

**Block Ja**

| Da2 | Da1 | Da0 | Ea4-0 |
|---|---|---|---|
| 0 | 0 | 0 | 10010 |
| 0 | 0 | 1 | 10001 |
| 0 | 1 | 0 | 01100 |
| 0 | 1 | 1 | 01010 |
| 1 | 0 | 0 | 01001 |
| 1 | 0 | 1 | 00110 |
| 1 | 1 | 0 | 00101 |
| 1 | 1 | 1 | 00011 |

| Db5 + Dc5 | | Da4 | Da3 | Ea6 | Ea5 |
|---|---|---|---|---|---|
| 0 | | x | x | 0 | 0 |
| 1 | | x | 0 | | 1 |
| 1 | | x | 1 | | 0 |
| 1 | | 0 | x | 1 | |
| 1 | | 1 | x | 0 | |

**Block Ka**

| Da2 | Da1 | Da0 | Ea4-0 |
|---|---|---|---|
| 0 | 0 | 0 | 11100 |
| 0 | 0 | 1 | 11010 |
| 0 | 1 | 0 | 11001 |
| 0 | 1 | 1 | 10110 |
| 1 | 0 | 0 | 10101 |
| 1 | 0 | 1 | 10011 |
| 1 | 1 | 0 | 01110 |
| 1 | 1 | 1 | 01101 |

| | Da5 | | Da3 | Ea6 | Ea5 |
|---|---|---|---|---|---|
| | | | 0 | | 1 |
| | | | 1 | | 0 |
| | 0 | | 0 | 1 | |
| | 0 | | 1 | 0 | |
| | 1 | | 0 | 0 | |
| | 1 | | 1 | 1 | |

236a

FIG. 13

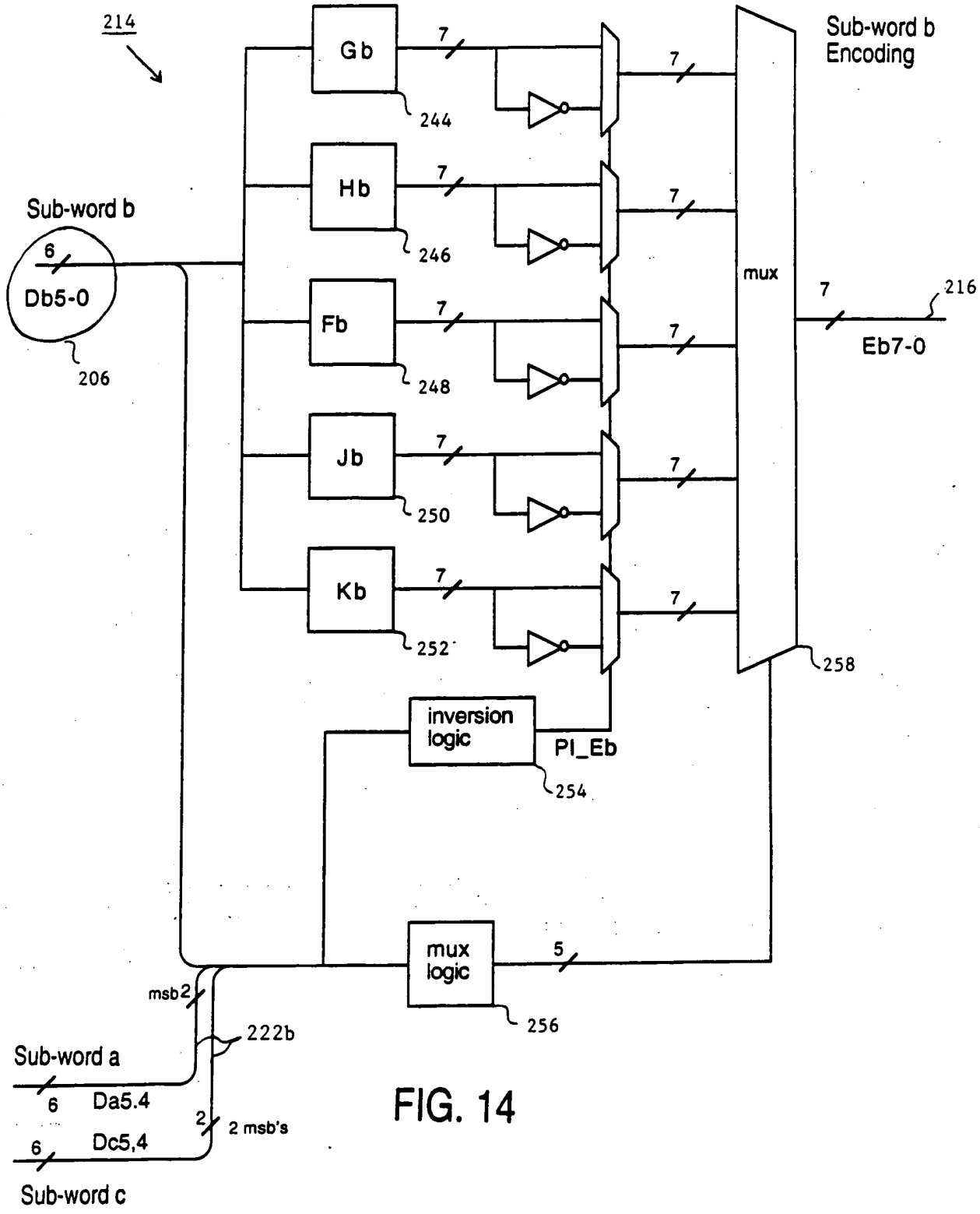

214
Gb
Hb
Fb
Jb
Kb
244
246
248
250
252
7
Sub-word b
Encoding
Sub-word b
6
Db5-0
206
mux
7
216
Eb7-0
258
inversion
logic
PI_Eb
254
mux
logic
5
256
msb2
222b
Sub-word a
6
Da5.4
2
2 msb's
6
Dc5,4
Sub-word c

FIG. 14

## Encode Truth Tables for Block Diagram Elements of Sub-word b

256b

| Subchannel b Mux Truth Table | | | | | |
|---|---|---|---|---|---|
| Db5 | Db4 | Db3 | Db2 | | Block |
| 0 | 0 | 0 | 0 | | G |
| 0 | 0 | 0 | 1 | | F1 |
| 0 | 0 | 1 | x | | J |
| 0 | 1 | 0 | x | | J |
| 0 | 1 | 1 | x | | K |
| 1 | 0 | 0 | x | | J |
| 1 | 0 | 1 | x | | K |
| 1 | 1 | 0 | x | | K |
| 1 | 1 | 1 | 0 | | F2 |
| 1 | 1 | 1 | 1 | | H |

254b

| Subch_b Post Inversion Truth Table | | | | | |
|---|---|---|---|---|---|
| Da4 | Da5 | Db5 | Dc5 | Dc4 | Pi_Eb |
| 0 | 0 | 0 | 0 | x | Invert |
| all other combinations | | | | | no inversion |
| x | 1 | 1 | 1 | 1 | Invert |

| Block Gb | | | |
|---|---|---|---|
| Db1 | Db0 | Eb4-0 | |
| 0 | 0 | 10000 | |
| 0 | 1 | 01000 | |
| 1 | 0 | 00100 | |
| 1 | 1 | 00010 | |
| | | Eb6 | Eb5 |
| always 1 for Gb | | 1 | 1 |

244b

| Block Hb | | | |
|---|---|---|---|
| Db1 | Db0 | Eb4-0 | |
| 0 | 0 | 11101 | |
| 0 | 1 | 11011 | |
| 1 | 0 | 10111 | |
| 1 | 1 | 01111 | |
| | | Eb6 | Eb5 |
| always 0 for Hb | | 0 | 0 |

246b

| Block Fb | | | |
|---|---|---|---|
| Db1 | Db0 | Eb4-0 | |
| 0 | 0 | 11000 | |
| 0 | 1 | 10100 | |
| 1 | 0 | 01011 | |
| 1 | 1 | 00111 | |
| Db2 | Db1 | | Eb6 Eb5 |
| x | 0 | | 1 |
| x | 1 | | 0 |
| 0 | x | | 1 |
| 1 | x | | 0 |

248b

250b

| Block Jb | | | | | |
|---|---|---|---|---|---|
| Db2 | Db1 | Db0 | Eb4-0 | | |
| 0 | 0 | 0 | 10010 | | |
| 0 | 0 | 1 | 10001 | | |
| 0 | 1 | 0 | 01100 | | |
| 0 | 1 | 1 | 01010 | | |
| 1 | 0 | 0 | 01001 | | |
| 1 | 0 | 1 | 00110 | | |
| 1 | 1 | 0 | 00101 | | |
| 1 | 1 | 1 | 00011 | | |
| | | Db4 | Db3 | Eb6 | Eb5 |
| | | x | 0 | | 1 |
| | | x | 1 | | 0 |
| | | 0 | x | 1 | |
| | | 1 | x | 0 | |

| Block Kb | | | | | |
|---|---|---|---|---|---|
| Db2 | Db1 | Db0 | Eb4-0 | | |
| 0 | 0 | 0 | 11100 | | |
| 0 | 0 | 1 | 11010 | | |
| 0 | 1 | 0 | 11001 | | |
| 0 | 1 | 1 | 10110 | | |
| 1 | 0 | 0 | 10101 | | |
| 1 | 0 | 1 | 10011 | | |
| 1 | 1 | 0 | 01110 | | |
| 1 | 1 | 1 | 01101 | | |
| | | Db4 | Db3 | Eb6 | Eb5 |
| | | x | 0 | | 0 |
| | | x | 1 | | 1 |
| | | 0 | x | 1 | |
| | | 1 | x | 0 | |

252b

FIG. 15

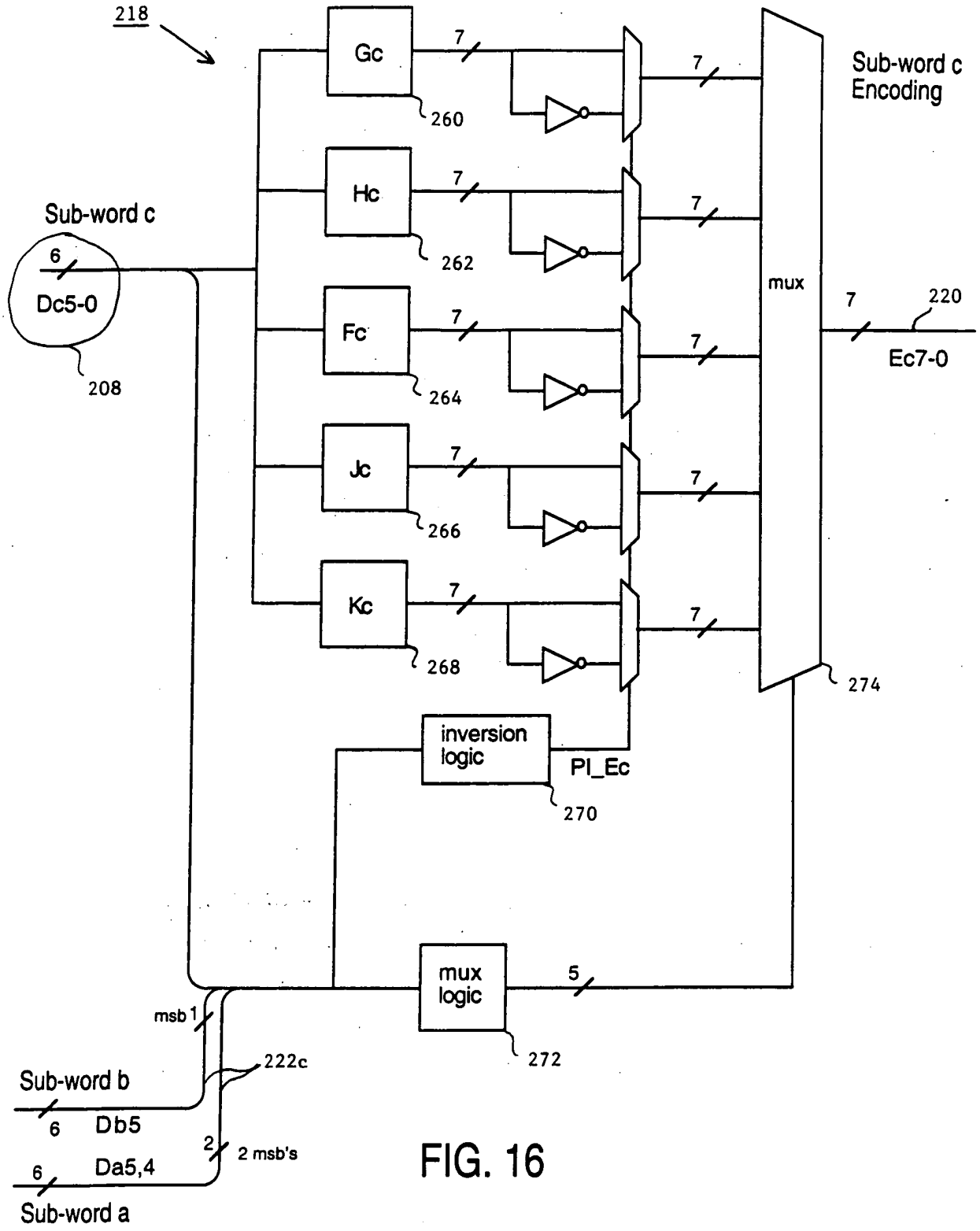

218
Gc
7
260
Hc
262
Fc
264
Jc
266
Kc
268
Sub-word c
Encoding
Sub-word c
6
Dc5-0
208
mux
7
220
Ec7-0
274
inversion
logic
PI_Ec
270
mux
logic
5
272
msb 1
222c
Sub-word b
6
Db5
2
2 msb's
6
Da5,4
Sub-word a

FIG. 16

## Encode Truth Tables for Block Diagram Elements of Sub-word c

**Subchannel c Mux Truth Table**

| Dc5 | Dc4 | Dc3 | Dc2 | Da5·Db5 | Block |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | x | G |
| 0 | 0 | 0 | 1 | x | F1 |
| 0 | 0 | 1 | x | x | J |
| 0 | 1 | 0 | x | x | J |
| 0 | 1 | 1 | x | x | K |
| 1 | 0 | 0 | x | 0 | J |
| 1 | 0 | 0 | x | 1 | G |
| 1 | 0 | 1 | x | 0 | K |
| 1 | 0 | 1 | x | 1 | J |
| 1 | 1 | 0 | x | x | K |
| 1 | 1 | 1 | 0 | 0 | F2 |
| 1 | 1 | 1 | 1 | 0 | H |
| 1 | 1 | 1 | x | 1 | H |

272c

**Subch_c Post Inversion Truth Table**

| Da4+Da5+Db5+Dc5 | PI Ec |
|---|---|
| 0 | Invert |
| 1 | no inversion |

270c

**Block Gc**

| Dc1 | Dc0 | Ec4-0 |
|---|---|---|
| 0 | 0 | 10000 |
| 0 | 1 | 01000 |
| 1 | 0 | 00100 |
| 1 | 1 | 00010 |

| Dc5 | Dc2 | Ec6 | Ec5 |
|---|---|---|---|
| 0 | 0 | 1 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 |

260c

**Block Hc**

| Dc1 | Dc0 | Ec4-0 |
|---|---|---|
| 0 | 0 | 11101 |
| 0 | 1 | 11011 |
| 1 | 0 | 10111 |
| 1 | 1 | 01111 |

| Da5·Db5 | Dc2 | Ec6 | Ec5 |
|---|---|---|---|
| 0 | x | 0 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 |

262c

**Block Fc**

| Dc1 | Dc0 | Ec4-0 |
|---|---|---|
| 0 | 0 | 11000 |
| 0 | 1 | 10100 |
| 1 | 0 | 01011 |
| 1 | 1 | 00111 |

| Dc2 | Dc1 | | Ec6 | Ec5 |
|---|---|---|---|---|
| x | 0 | | 1 | |
| x | 1 | | 0 | |
| 0 | x | | | 1 |
| 1 | x | | | 0 |

264c

266c

**Block Jc**

| Dc2 | Dc1 | Dc0 | Ec4-0 |
|---|---|---|---|
| 0 | 0 | 0 | 10010 |
| 0 | 0 | 1 | 10001 |
| 0 | 1 | 0 | 01100 |
| 0 | 1 | 1 | 01010 |
| 1 | 0 | 0 | 01001 |
| 1 | 0 | 1 | 00110 |
| 1 | 1 | 0 | 00101 |
| 1 | 1 | 1 | 00011 |

| | Dc5 | | Dc3 | Ec6 | Ec5 |
|---|---|---|---|---|---|
| | | | 0 | | 1 |
| | | | 1 | | 0 |
| | 0 | | 0 | 0 | |
| | 0 | | 1 | 1 | |
| | 1 | | 0 | 1 | |
| | 1 | | 1 | 0 | |

**Block Kc**

| Dc2 | Dc1 | Dc0 | Ec4-0 |
|---|---|---|---|
| 0 | 0 | 0 | 11100 |
| 0 | 0 | 1 | 11010 |
| 0 | 1 | 0 | 11001 |
| 0 | 1 | 1 | 10110 |
| 1 | 0 | 0 | 10101 |
| 1 | 0 | 1 | 10011 |
| 1 | 1 | 0 | 01110 |
| 1 | 1 | 1 | 01101 |

| Da5·Db5 | | Dc4 | Dc3 | Ec6 | Ec5 |
|---|---|---|---|---|---|
| 0 | | x | 0 | | 0 |
| 0 | | x | 1 | | 1 |
| 0 | | 0 | x | 1 | |
| 0 | | 1 | x | 0 | |
| 1 | | x | x | 1 | 1 |

268c

FIG. 17

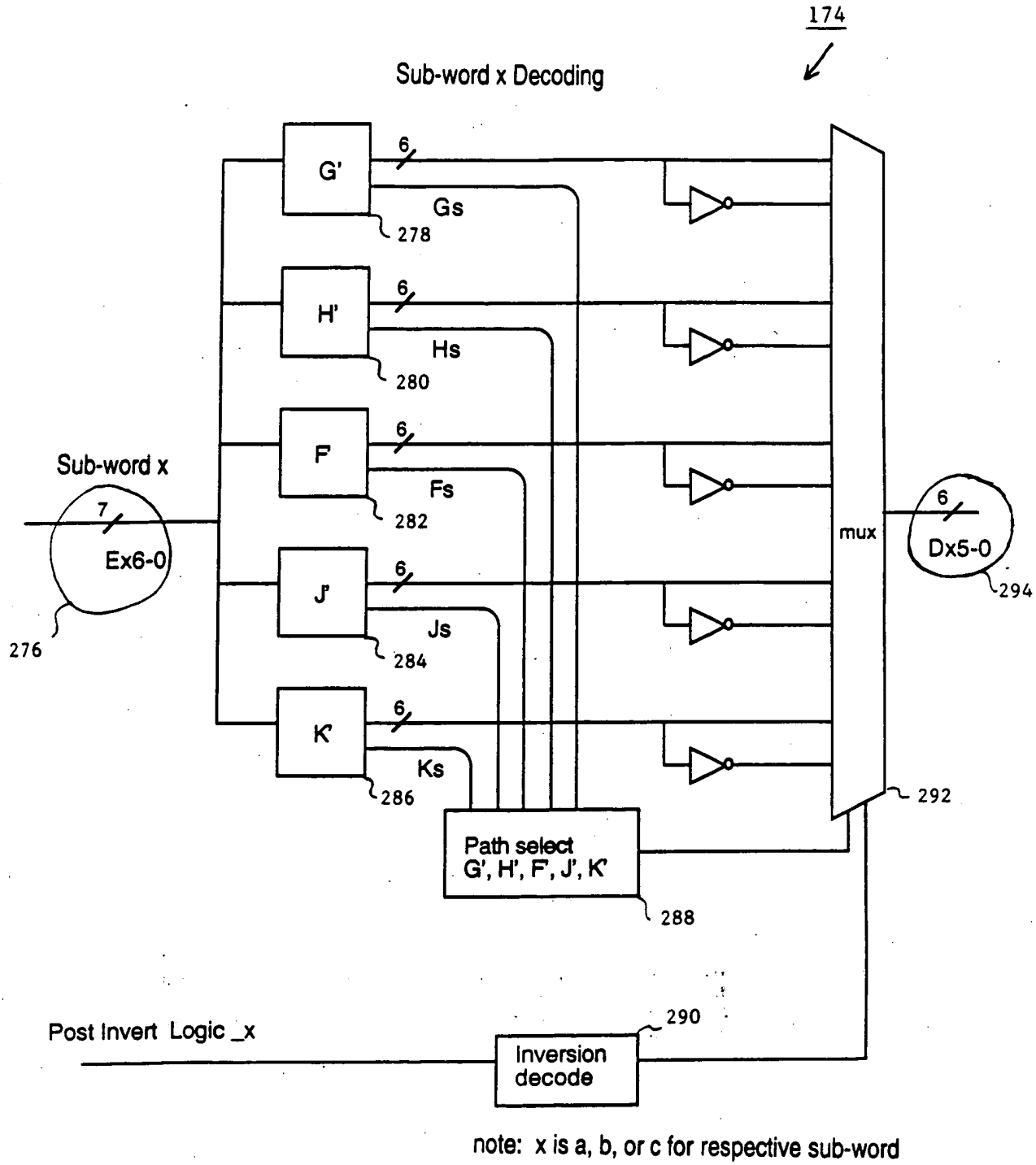

174
Sub-word x Decoding
G'
6
Gs
278
H'
6
Hs
280
F'
6
Fs
282
J'
6
Js
284
K'
6
Ks
286
Sub-word x
7
Ex6-0
276
mux
6
Dx5-0
294
292
Path select
G', H', F', J', K'
288
Post Invert Logic _x
290
Inversion
decode
note: x is a, b, or c for respective sub-word

FIG. 18

296

Truth Table for Sub-word Decode

Decode Mux Truth Table Sub-word a

| | Decode Path Mux Control | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ea4-0 | Gas | Has | Fas | Jas | Kas | Block | Da5 | Da4 | Da3 | Da2 | Da1 | Da0 | |
| 10000 | 1 | 0 | 0 | 0 | 0 | G′ | 0 | 0 | 0 | Ea5_ | 0 | 0 | 278a |
| 01000 | 1 | 0 | 0 | 0 | 0 | G′ | 0 | 0 | 0 | Ea5_ | 0 | 1 | |
| 00100 | 1 | 0 | 0 | 0 | 0 | G′ | 0 | 0 | 0 | Ea5_ | 1 | 0 | |
| 00010 | 1 | 0 | 0 | 0 | 0 | G′ | 0 | 0 | 0 | Ea5_ | 1 | 1 | |
| 11101 | 0 | 1 | 0 | 0 | 0 | H′ | Ea6_·Ea5_ | 1 | 1 | Ea5_ | 0 | 0 | 280a |
| 11011 | 0 | 1 | 0 | 0 | 0 | H′ | Ea6_·Ea5_ | 1 | 1 | Ea5_ | 0 | 1 | |
| 10111 | 0 | 1 | 0 | 0 | 0 | H′ | Ea6_·Ea5_ | 1 | 1 | Ea5_ | 1 | 0 | |
| 01111 | 0 | 1 | 0 | 0 | 0 | H′ | Ea6_·Ea5_ | 1 | 1 | Ea5_ | 1 | 1 | |
| 11000 | 0 | 0 | 1 | 0 | 0 | F′ | Ea5 | Ea5 | Ea5 | Ea5_ | 0 | 0 | 282a |
| 10100 | 0 | 0 | 1 | 0 | 0 | F′ | Ea5 | Ea5 | Ea5 | Ea5_ | 0 | 1 | |
| 01011 | 0 | 0 | 1 | 0 | 0 | F′ | Ea5 | Ea5 | Ea5 | Ea5_ | 1 | 0 | |
| 00111 | 0 | 0 | 1 | 0 | 0 | F′ | Ea5 | Ea5 | Ea5 | Ea5_ | 1 | 1 | |
| 10010 | 0 | 0 | 0 | 1 | 0 | J′ | Ea5·Ea6 | Ea6_·Ea5 | Ea5_ | 0 | 0 | 0 | 284a |
| 10001 | 0 | 0 | 0 | 1 | 0 | J′ | Ea5·Ea6 | Ea6_·Ea5 | Ea5_ | 0 | 0 | 1 | |
| 01100 | 0 | 0 | 0 | 1 | 0 | J′ | Ea5·Ea6 | Ea6_·Ea5 | Ea5_ | 0 | 1 | 0 | |
| 01010 | 0 | 0 | 0 | 1 | 0 | J′ | Ea5·Ea6 | Ea6_·Ea5 | Ea5_ | 0 | 1 | 1 | |
| 01001 | 0 | 0 | 0 | 1 | 0 | J′ | Ea5·Ea6 | Ea6_·Ea5 | Ea5_ | 1 | 0 | 0 | |
| 00110 | 0 | 0 | 0 | 1 | 0 | J′ | Ea5·Ea6 | Ea6_·Ea5 | Ea5_ | 1 | 0 | 1 | |
| 00101 | 0 | 0 | 0 | 1 | 0 | J′ | Ea5·Ea6 | Ea6_·Ea5 | Ea5_ | 1 | 1 | 0 | |
| 00011 | 0 | 0 | 0 | 1 | 0 | J′ | Ea5·Ea6 | Ea6_·Ea5 | Ea5_ | 1 | 1 | 1 | |
| 11100 | 0 | 0 | 0 | 0 | 1 | K′ | Ea6 xor Ea5 | Ea6_ + Ea5 | Ea5_ | 0 | 0 | 0 | 286a |
| 11010 | 0 | 0 | 0 | 0 | 1 | K′ | Ea6 xor Ea5 | Ea6_ + Ea5 | Ea5_ | 0 | 0 | 1 | |
| 11001 | 0 | 0 | 0 | 0 | 1 | K′ | Ea6 xor Ea5 | Ea6_ + Ea5 | Ea5_ | 0 | 1 | 0 | |
| 10110 | 0 | 0 | 0 | 0 | 1 | K′ | Ea6 xor Ea5 | Ea6_ + Ea5 | Ea5_ | 0 | 1 | 1 | |
| 10101 | 0 | 0 | 0 | 0 | 1 | K′ | Ea6 xor Ea5 | Ea6_ + Ea5 | Ea5_ | 1 | 0 | 0 | |
| 10011 | 0 | 0 | 0 | 0 | 1 | K′ | Ea6 xor Ea5 | Ea6_ + Ea5 | Ea5_ | 1 | 0 | 1 | |
| 01110 | 0 | 0 | 0 | 0 | 1 | K′ | Ea6 xor Ea5 | Ea6_ + Ea5 | Ea5_ | 1 | 1 | 0 | |
| 01101 | 0 | 0 | 0 | 0 | 1 | K′ | Ea6 xor Ea5 | Ea6_ + Ea5 | Ea5_ | 1 | 1 | 1 | |

Post Inversion Logic

Invert Results of sub-word a decode if W5subCh_c =1

Invert decoded value for sub-word a if the weight of sub-word c equals 5

290a

FIG. 19

298

**Decode Mux Truth Table Sub-word b**

| | Decode Path Mux Control | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eb4-0 | Gbs | Hbs | Fbs | Jbs | Kbs | Block | | Db5 | Db4 | Db3 | Db2 | Db1 | Db0 |
| 10000 | 1 | 0 | 0 | 0 | 0 | G′ | | 0 | 0 | 0 | 0 | 0 | 0 |
| 01000 | 1 | 0 | 0 | 0 | 0 | G′ | | 0 | 0 | 0 | 0 | 0 | 1 |
| 00100 | 1 | 0 | 0 | 0 | 0 | G′ | | 0 | 0 | 0 | 0 | 1 | 0 |
| 00010 | 1 | 0 | 0 | 0 | 0 | G′ | | 0 | 0 | 0 | 0 | 1 | 1 |
| 11101 | 0 | 1 | 0 | 0 | 0 | H′ | | 1 | 1 | 1 | 1 | 0 | 0 |
| 11011 | 0 | 1 | 0 | 0 | 0 | H′ | | 1 | 1 | 1 | 1 | 0 | 1 |
| 10111 | 0 | 1 | 0 | 0 | 0 | H′ | | 1 | 1 | 1 | 1 | 1 | 0 |
| 01111 | 0 | 1 | 0 | 0 | 0 | H′ | | 1 | 1 | 1 | 1 | 1 | 1 |
| 11000 | 0 | 0 | 1 | 0 | 0 | F′ | | Eb5 | Eb5 | Eb5 | Eb5_ | 0 | 0 |
| 10100 | 0 | 0 | 1 | 0 | 0 | F′ | | Eb5 | Eb5 | Eb5 | Eb5_ | 0 | 1 |
| 01011 | 0 | 0 | 1 | 0 | 0 | F′ | | Eb5 | Eb5 | Eb5 | Eb5_ | 1 | 0 |
| 00111 | 0 | 0 | 1 | 0 | 0 | F′ | | Eb5 | Eb5 | Eb5 | Eb5_ | 1 | 1 |
| 10010 | 0 | 0 | 0 | 1 | 0 | J′ | | Eb5·Eb6 | Eb6_ | Eb5_ | 0 | 0 | 0 |
| 10001 | 0 | 0 | 0 | 1 | 0 | J′ | | Eb5·Eb6 | Eb6_ | Eb5_ | 0 | 0 | 1 |
| 01100 | 0 | 0 | 0 | 1 | 0 | J′ | | Eb5·Eb6 | Eb6_ | Eb5_ | 0 | 1 | 0 |
| 01010 | 0 | 0 | 0 | 1 | 0 | J′ | | Eb5·Eb6 | Eb6_ | Eb5_ | 0 | 1 | 1 |
| 01001 | 0 | 0 | 0 | 1 | 0 | J′ | | Eb5·Eb6 | Eb6_ | Eb5_ | 1 | 0 | 0 |
| 00110 | 0 | 0 | 0 | 1 | 0 | J′ | | Eb5·Eb6 | Eb6_ | Eb5_ | 1 | 0 | 1 |
| 00101 | 0 | 0 | 0 | 1 | 0 | J′ | | Eb5·Eb6 | Eb6_ | Eb5_ | 1 | 1 | 0 |
| 00011 | 0 | 0 | 0 | 1 | 0 | J′ | | Eb5·Eb6 | Eb6_ | Eb5_ | 1 | 1 | 1 |
| 11100 | 0 | 0 | 0 | 0 | 1 | K′ | | Eb6 + Eb5 | Eb6_ | Eb5_ | 0 | 0 | 0 |
| 11010 | 0 | 0 | 0 | 0 | 1 | K′ | | Eb6 + Eb5 | Eb6_ | Eb5_ | 0 | 0 | 1 |
| 11001 | 0 | 0 | 0 | 0 | 1 | K′ | | Eb6 + Eb5 | Eb6_ | Eb5_ | 0 | 1 | 0 |
| 10110 | 0 | 0 | 0 | 0 | 1 | K′ | | Eb6 + Eb5 | Eb6_ | Eb5_ | 0 | 1 | 1 |
| 10101 | 0 | 0 | 0 | 0 | 1 | K′ | | Eb6 + Eb5 | Eb6_ | Eb5_ | 1 | 0 | 0 |
| 10011 | 0 | 0 | 0 | 0 | 1 | K′ | | Eb6 + Eb5 | Eb6_ | Eb5_ | 1 | 0 | 1 |
| 01110 | 0 | 0 | 0 | 0 | 1 | K′ | | Eb6 + Eb5 | Eb6_ | Eb5_ | 1 | 1 | 0 |
| 01101 | 0 | 0 | 0 | 0 | 1 | K′ | | Eb6 + Eb5 | Eb6_ | Eb5_ | 1 | 1 | 1 |

278b

280b

282b

284b

286b

Post Inversion Logic

Invert Results of sub-word _b decode if W5subCh_c + W2subCh_a =1
W5subCh_c = Kcs·Ec6·Ec5 + Hcs·(Ec6 + Ec5)
W2subCh_a = Jas·Ea6_·Ea5_ + Gas·(Ea6_ + Ea5_)

Invert decoded value for sub-word b if the weight of sub-word c = 5 and/or the weight of sub-word a = 2

290b

FIG. 20

300

**Decode Mux Truth Table Sub-word c**

| | Decode Path Mux Control | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ec4-0 | Gcs | Hcs | Fcs | Jcs | Kcs | Block | | Dc5 | Dc4 | Dc3 | Dc2 | Dc1 | Dc0 | |
| 10000 | 1 | 0 | 0 | 0 | 0 | G′ | | Ec6_+Ec5_ | 0 | 0 | Ec5_ | 0 | 0 | 278c |
| 01000 | 1 | 0 | 0 | 0 | 0 | G′ | | Ec6_+Ec5_ | 0 | 0 | Ec5_ | 0 | 1 | |
| 00100 | 1 | 0 | 0 | 0 | 0 | G′ | | Ec6_+Ec5_ | 0 | 0 | Ec5_ | 1 | 0 | |
| 00010 | 1 | 0 | 0 | 0 | 0 | G′ | | Ec6_+Ec5_ | 0 | 0 | Ec5_ | 1 | 1 | |
| 11101 | 0 | 1 | 0 | 0 | 0 | H′ | | 1 | 1 | 1 | Ec5_ | 0 | 0 | 280c |
| 11011 | 0 | 1 | 0 | 0 | 0 | H′ | | 1 | 1 | 1 | Ec5_ | 0 | 1 | |
| 10111 | 0 | 1 | 0 | 0 | 0 | H′ | | 1 | 1 | 1 | Ec5_ | 1 | 0 | |
| 01111 | 0 | 1 | 0 | 0 | 0 | H′ | | 1 | 1 | 1 | Ec5_ | 1 | 1 | |
| 11000 | 0 | 0 | 1 | 0 | 0 | F′ | | Ec5 | Ec5 | Ec5 | Ec5_ | 0 | 0 | 282c |
| 10100 | 0 | 0 | 1 | 0 | 0 | F′ | | Ec5 | Ec5 | Ec5 | Ec5_ | 0 | 1 | |
| 01011 | 0 | 0 | 1 | 0 | 0 | F′ | | Ec5 | Ec5 | Ec5 | Ec5_ | 1 | 0 | |
| 00111 | 0 | 0 | 1 | 0 | 0 | F′ | | Ec5 | Ec5 | Ec5 | Ec5_ | 1 | 1 | |
| 10010 | 0 | 0 | 0 | 1 | 0 | J′ | | (Ec5 xor Ec6)_ | Ec6_ · Ec5 | Ec5_ | 0 | 0 | 0 | 284c |
| 10001 | 0 | 0 | 0 | 1 | 0 | J′ | | (Ec5 xor Ec6)_ | Ec6_ · Ec5 | Ec5_ | 0 | 0 | 1 | |
| 01100 | 0 | 0 | 0 | 1 | 0 | J′ | | (Ec5 xor Ec6)_ | Ec6_ · Ec5 | Ec5_ | 0 | 1 | 0 | |
| 01010 | 0 | 0 | 0 | 1 | 0 | J′ | | (Ec5 xor Ec6)_ | Ec6_ · Ec5 | Ec5_ | 0 | 1 | 1 | |
| 01001 | 0 | 0 | 0 | 1 | 0 | J′ | | (Ec5 xor Ec6)_ | Ec6_ · Ec5 | Ec5_ | 1 | 0 | 0 | |
| 00110 | 0 | 0 | 0 | 1 | 0 | J′ | | (Ec5 xor Ec6)_ | Ec6_ · Ec5 | Ec5_ | 1 | 0 | 1 | |
| 00101 | 0 | 0 | 0 | 1 | 0 | J′ | | (Ec5 xor Ec6)_ | Ec6_ · Ec5 | Ec5_ | 1 | 1 | 0 | |
| 00011 | 0 | 0 | 0 | 1 | 0 | J′ | | (Ec5 xor Ec6)_ | Ec6_ · Ec5 | Ec5_ | 1 | 1 | 1 | |
| 11100 | 0 | 0 | 0 | 0 | 1 | K′ | | Ec6 + Ec5 | Ec6_ + Ec5 | Ec5_ | 0 | 0 | 0 | 286c |
| 11010 | 0 | 0 | 0 | 0 | 1 | K′ | | Ec6 + Ec5 | Ec6_ + Ec5 | Ec5_ | 0 | 0 | 1 | |
| 11001 | 0 | 0 | 0 | 0 | 1 | K′ | | Ec6 + Ec5 | Ec6_ + Ec5 | Ec5_ | 0 | 1 | 0 | |
| 10110 | 0 | 0 | 0 | 0 | 1 | K′ | | Ec6 + Ec5 | Ec6_ + Ec5 | Ec5_ | 0 | 1 | 1 | |
| 10101 | 0 | 0 | 0 | 0 | 1 | K′ | | Ec6 + Ec5 | Ec6_ + Ec5 | Ec5_ | 1 | 0 | 0 | |
| 10011 | 0 | 0 | 0 | 0 | 1 | K′ | | Ec6 + Ec5 | Ec6_ + Ec5 | Ec5_ | 1 | 0 | 1 | |
| 01110 | 0 | 0 | 0 | 0 | 1 | K′ | | Ec6 + Ec5 | Ec6_ + Ec5 | Ec5_ | 1 | 1 | 0 | |
| 01101 | 0 | 0 | 0 | 0 | 1 | K′ | | Ec6 + Ec5 | Ec6_ + Ec5 | Ec5_ | 1 | 1 | 1 | |

Post Inversion Logic

Invert Results of sub-word b decode if W2subCh_a =1

W2subCh_a = Jas·Ea6_·Ea5_ + Gas·(Ea6_ + Ea5_)

Invert decoded value for sub-word c if the weight of sub-word a = 2

290c

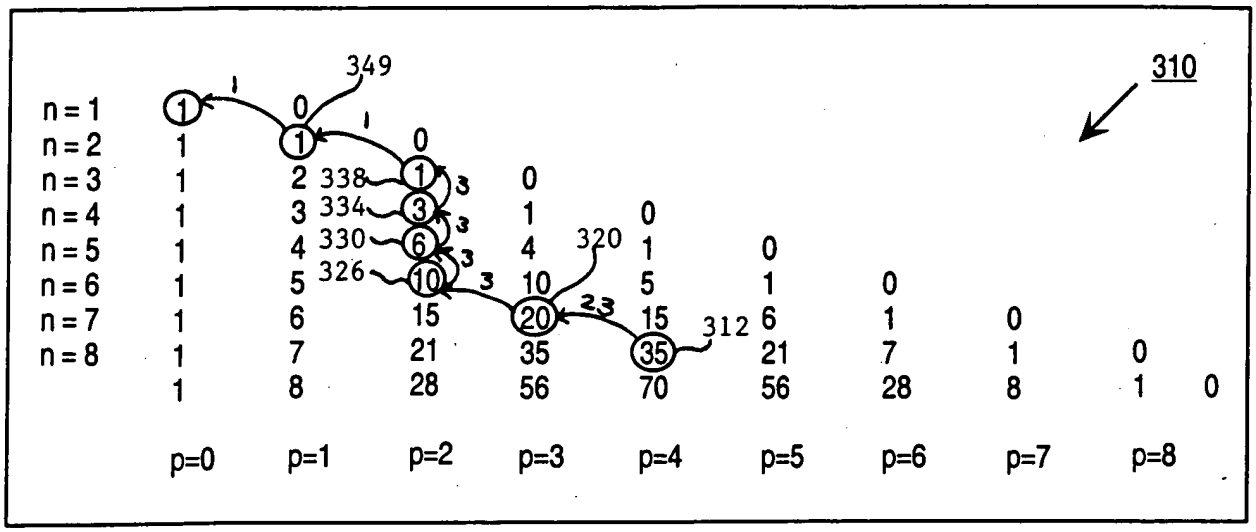
FIG. 21

302

(4B/6L EXAMPLE)
CORRESPONDENCE BETWEEN
DECIMAL, BINARY, AND ENCODED VALUES

| 304 | 306 | 308 |
|---|---|---|
| DECIMAL VALUE | BINARY VALUE | ENCODED VALUE |
| DECIMAL COUNT | BINARY COUNT | BINOMIAL COUNT |
| 0 | 0000 | 000111 |
| 1 | 0001 | 001011 |
| 2 | 0010 | 001101 |
| 3 | 0011 | 001110 |
| 4 | 0100 | 010011 |
| 5 | 0101 | 010101 |
| 6 | 0110 | 010110 |
| 7 | 0111 | 011001 |
| 8 | 1000 | 011010 |
| 9 | 1001 | 011100 |
| 10 | 1010 | 100011 |
| 11 | 1011 | 100101 |
| 12 | 1100 | 100110 |
| 13 | 1101 | 101001 |
| 14 | 1110 | 101010 |
| 15 | 1111 | 101100 |
| 16 | EXTRA | 110001 |
| 17 | EXTRA | 110010 |
| 18 | EXTRA | 110100 |
| 19 | EXTRA | 111000 |

FIG. 22




$$n_p = \frac{(n\,(n-1)\,(n-2)\,.\,.\,.\,.\,n-[p-1])}{1 \cdot 2 \cdot 3 \cdot .\,.\,.\,.\,p}$$

310a

$58_{10} = 11000110$

310b

FIG. 23